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ABSTRACT

Sex difference research has been plagued with a myriad of problems,. Specifically, intelligence testing, if dependent on measurement of spatial or verbal proficiency, may not be an accurate indicator of native ability. Similarly, infrequent replication of studies, studies that only include subjects of one sex yet imply sex differences, and poor test validity are issues that concern the researcher. Cultural expectations may largely account for sex role differences and ethnic stereotyping, although causes are elusive. According to the review of research conducted by Maccoby and Jacklin (1974), the following myths may be defined: Girls are more social, "suggestable," auditory, and affected by heredity than boys; girls are better at rote learning and have lower self esteem than boys; boys are more analytic, achievement oriented, and affected by environment than girls. Research "realities" include evidence that while girls have greater verbal ability than boys, boys excel in visual-spatial ability, mathematical ability, and are more aggressive than girls. The physiological basis for these differences (such as brain lateralization, hormones, etc.) has not been substantiated. Rather, the notion of cultural reinforcement seems much more realistic. (KS)

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REVIEW OF RESEARCH

SEX DIFFERENCES IN INTELLECTUAL FUNCTIONING: MYTH OR REALITY

For Presentation at Symposium

UNDERSTANDING & PROMOTING POSITIVE
SEX ROLE IDENTIFICATION THROUGH THE
READING CURRICULUM

2:00 - 4:45 P.M.

Royal Inn - Monopoly A

May 12, 1976

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CS002543

Judith R. Glickman

REVIEW OF RESEARCH

Sex Differences in Intellectual Functioning: Myth or Reality

Recently, several conferences in which I have participated or attended have addressed the question of whether sex differences in intellectual functioning are real or whether such differences are mythical. That question in itself constitutes a problem. What is meant by a real difference? Is a real difference one which has been empirically shown to be so in the context of an experimental study or is such reality determined by whether or not a 14-year-old girl is doing less well in Algebra I than her male peer or whether a 12-year-old boy is less apt to read at or above grade level than his female peer.

In one instance as the speaker discussed research findings the audience as a whole first fidgeted and then openly reacted. This was an unfortunate situation because the speaker did not have the opportunity to relate those findings of her research which shed some light on the topic. In another respect, this was a most fortunate occurrence in that it made clear how strongly people felt about the influence of socialization and cultural reinforcement in solidifying sex role expectations in the young child even before s(he) entered school.

For these reasons this presentation will focus initially on the problems involved in research interpretation and will then proceed to describe the findings of sex differences in intellectual functioning within the context of several on-going programs which are designed to address these hypotheses and which, in addition, have revealed some serendipitous findings concerning the <u>real</u> effect of sex differences.

Scientific studies frequently use words which are familiar to most people. For example, the word "intelligence" connotes a myriad of images but when researchers are interested in determining whether girls are more intelligent than boys, or vice versa, the composite abilities must be redefined and narrowed to discrete qualities. For instance, many intelligence tests are highly dependent

on verbal ability; mathematics tests are often dependent upon spatial abilities. Thus, if there are basic sex differences in verbal and spatial abilities, this could affect other measures of performance. It would be difficult to get an accurate measure of basic intelligence if the test required an ability in which one sex was weaker (because of either lack of training due to socialization or heredity) (Golden & Hunter, 1974).

Secondly, few replications of studies have been published. While there are reports of isolated findings of sex differences throughout the literature, findings of no difference, or later findings showing opposite results are frequently ignored (Maccoby & Jacklin, 1974).

Writers sometimes refer to studies that included only subjects of one sex as though they had demonstrated a sex difference. For example, Bell (1960) reporting on an all-male population, said that activity level was high in newborn boys who had suffered some degree of birth complications, compared to those who had not. He then speculated that since boys more often suffer birth complications, this might explain a higher neonatal activity level among boys.

Different patterns of findings within each sex have sometimes been mistaken for sex differences. For example, Sears et al (1965) found that among a sample of preschool girls verbal aggression was more frequent than physical aggression. Among boys the reverse was true. These findings were later interpreted by others as showing that girls were higher than boys in verbal agression. In fact, boys showed more of both kinds of aggression.

Whether a test measures what it purports to measure is an additional consideration. For instance it has been found that boys showed greater aptitute in quantitative skills than do girls. It is possible that what test scores reflect is not that boys are superior in math itself but that they are superior in a separate dimension - spatial ability (Maccoby & Jacklin, 1974). Dwyer (1975) has found a disproportionate number of geometry problems (requiring spatial ability)

over algebra problems on the SAT-M. The test thus favors boys in their performance on mathematics achievement.

Finally, in examination of sex differences in intellectual functioning it is important to remember that more boys drop out of high school than girls. Therefore, over the years girls are compared with an increasingly select sample of boys. If this is the case sex differences would be exaggerated where boys excel and minimized where girls excel (Maccoby & Jacklin, 1972).

As a result of their literature review Maccoby and Jacklin (1974) hold the opinion that sex differences may be overstated. In considering the following research findings you are encouraged to keep these research interpretation problems in mind.

An intellectually gifted child program has been conducted at The John Hopkins University Summer Session since 1972. 2063 boys and 47 girls were selected for the study based on a score of 600 or more on the SAT. The summer program was originally designed to encourage precocious adolescents to pursue their academic talents through a high-powered summer course in a university setting. It was originally assumed that academically talented youth, particularly such intellectually gifted boys and girls, would be very enthusiastic about the oportunity to pursue their intellectual interests with their peers.

In reality, what was expected did not happen in all cases. The highest scoring girl on the SAT-M performed over 90 points lower than the highest scoring boy. The disproportionate number of boys in the program reveals the different math achievement between 7th and 8th grade boys and girls. When each of the students were contacted, unequivocably the boys were eager to participate and looked upon the program with total enthusiasm. The girls, on the other hand, were very hesitant. Even when offered free tuition many of them were fearful to take the "risk", so to speak. Once the girls came for the summer session they were clearly in the minority and didn't like it at all. One parent commented that her daughter didn't

like it at all. One parent commented that her daughter didn't want to continue because no one would eat lunch with her and no one talked to her during the entire day.

One of the goals of the program was to encourage the students to skip grades if they were academically ready. This was a totally unacceptable option for the girls. The boys, although physically less mature at this age, saw no problem in grade skipping. The girls expressed fear of peer rejection as well as fear of teacher rejection. Another study (Lockheed and Harris, 1975) showed the same syndrome. Although the program assured the girls they were totally competent in a specific task, and even after they observed themselves on videotape performing that task competently, when asked to perform in front of male peers they reverted to a state of total incompetence!

As such the intervention program experienced great difficulty with 7th and 8th grade adolescents but by the 11th grade some of those girls who had refused to participate during the 7th grade were calling project personnel and were asking to re-enter and participate. Sells (1975) study, however, shows that 11th grade is too late for intervention.

Our experience with 7th-12th grade girls has complemented some of these findings (Lawrence Hall of Science/Mills College Expanding Your Horizons' Program). Teachers observed that their students' behavior in an all-girl setting was significantly different than when they were in the co-educational regular classroom. The girls exhibited a higher degree of competence and self-confidence and responded very positively to peer group models as tutors. I feel uncomfortable in drawing any sweeping conclusions about doing away with co-educational classes for adolescent girls and boys but feel the need to state the <u>possibility</u>, at any rate.

When students in the program were questioned further some consistent responses were borne out beyond the obvious achievement differences. Extreme differences between boys' and girls' early sex role conditioning were found. Boys were

intrinsically interested in reading mathematics textbooks, Scientific American journals and in taking advanced placement courses to supplement their school work. Toys in early childhood often reflected the traditional stereotypes - tinker toys and trucks and dolls and dishes. I'll leave it to your vi id imagination to speculate as to who played with what! Even in those cases in which parents or other adults purposely avoided sex stereotyping in toys it has been observed that children at a very young age do the stereotyping themselves and to each other. There is, however, clear evidence to show that different cultural groups show consistently different patterns of achievement. Lesser, Fifer, and Clark (1965) showed in a study of New York City school children that Chinese populations were significantly more apt in spatial abilities and reasoning than comparable populations of other ethnic backgrounds. Likewise, Jews scored significantly higher on tests of verbal ability than did their middle class counterparts from other ethnic backgrounds. The bases for these differences are obscure but some thought might be given to the cultural reinforcement at any early age these groups may have given their children in those specific areas.

The Hopkins program exemplifies the myriad of concerns in defining sex differences. What is myth and what is reality? What actually contributes to differential achievement in boys and girls?

According to the review of research conducted by Maccoby and Jacklin (1974) .....

1. Girls are more social than boys. - Myth - Any differences that exist in "sociability" of the two sexes are more of kind than degree. Boys are highly oriented toward a peer group and congregate in larger groups; girls associate in pairs or small groups of agemates and may be somewhat more oriented toward adults, although the evidence for this is weak.

2. Girls are more "suggestible" than boys. - Myth - Boys or girls are equally likely to imitate others spontaneously. Secondly, the two sexes are equally susceptible to persuasive communications. When sex differences are found,

2. (Continued) girls are generally more likely to adapt their own judgments to those of the group whereas boys appear to be more likely to accept peer-group values when these conflict with their own.

3. Girls nave lower self-esteem than boys. - Myth - The sexes are highly similar in their overall self-satisfaction and self-confidence during childhood and adolescence. During the college years, however, men have a great sense of control over their own fate, and greater confidence in their probable performance on a variety of school-related tasks. However, this does not imply a generally lower level of self-esteem among women of this age.

4. Girls are better at rote learning and boys are better at higher cognitive processes. - Myth - Neither sex is more susceptible to simple conditioning or excels in simple paired-associates or other forms of "rote" learning.

5. Boys are more analytic than girls. - Myth - The sexes do not differ on tests of analytic cognitive style. Boys and girls are equally likely to respond to task-irrelevent aspects of a situation, so that neither sex excels in analyzing and selecting only those elements needed for the task. Boys superiority on visual-spatial tasks seems to be accounted for by spatial ability.

6. Girls are more affected by heredity; boys are more affected by environment. - Myth - Male identical twins are more alike than female identical twins, but the two sexes show equivalent amounts of resemblance to their parents.

7. Girls have less achievement motivation than boys. - Myth - In the pioneering studies of achievement motivation, girls scored higher than boys in achievement imagery under "neutral" conditions. Boys need to be challenged by appeals to ego or competitive motivation to bring their achievement imagery up to the level of girls.

8. Girls are more auditory; boys are more visual. - Myth - At most ages boys and girls are equally adept at discriminating speech sounds.

9. Girls have greater verbal ability than boys. - Reality - Girls before age 3 and after age 11 appear to show greater verbal ability. Recent SAT scores,

however, are not showing the great differences between the sexes that were previously found. (Harnischfeger & Wiley, 1976) ~~between the sexes that were previously found.~~ The Hopkins program showed no significant differences (Fox, 1976). Dwyer (1975) has speculated that increased effort to represent activities traditionally interesting to boys in reading textbooks as well as the overall educative effort to improve boys' interest in reading may account for some of this change.

10. Boys excel in visual-spatial ability. - Reality - Male superiority in this area is fairly consistent during adolescence and adulthood.

11. Boys excel in mathematical ability. - Reality - Beginning at age 12-13 boys' mathematical skills increase faster than girls. Both visual spatial and verbal processes are sometimes involved in the solution of mathematical problems; some math problems can be solved in either way, while others cannot, a fact that may help to explain the variation in degree of sex difference from one measure to another.

12. Boys are more agressive than girls - Reality - The sex difference in agression has been observed in all cultures in which the relevant behavior has been observed.

For those areas in which Maccoby and Jacklin have concluded that real sex differences exist there are a number of possible biological reasons for their occurrences. These include the different rates of development of girls and boys, lateralization of the brain into two hemispheres, and the influence of sex hormones.

For example, girls mature faster than boys and are ahead in language up until age three. In looking at parent-child resemblance in spatial ability, three studies have found significant cross-sex correlations (that is, boys' scores on spatial abilities correlated with their mothers' scores but not with

their fathers' scores; girls' scores correlated with their fathers' scores but not with their mothers' scores.) A girl must inherit the trait from both of her parents. Page (1976) still infers that strong early training accounts for a large part of this trait.

The brain lateralization theory is under severe question. Since lateralization occurs during early childhood and most sex differences do not show up until adolescence this theory does not account for the fact that lateralization has occurred before sex differences strongly emerge.

Although hormone work does show that there is a relationship between sex hormones and intellectual functioning, it so far does not explain the different patterns of intellectual abilities in the two sexes, nor is there any information on whether specific hormones are related closely to spatial or verbal abilities.

Finally physiological reasons for sex differences have not been fully substantiated to warrant any conclusions. The notion of cultural reinforcement seems much more realistic. Furthermore, if such inherent differences exist they should place little constraint upon the development of personalities, male or female.

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